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In the Claims:

1. In an impulse radio system, a method of estimating a separation distance between an impulse radio transmitter and an impulse radio receiver, comprising the steps of:

(a) transmitting an impulse signal from the transmitter, the impulse signal having one of an ultra-wideband and medium wideband frequency characteristics;

(b) receiving the transmitted impulse signal at a receiver spaced from the transmitter;

(c) measuring a signal strength of the received impulse signal; and

(d) estimating the separation distance based on the measured signal strength.

2. The method of claim 1, wherein step (d) includes the step of comparing the measured signal strength to a predetermined signal strength value indicative of a predetermined separation distance.

3. The method of claim 2, further comprising the step of indicating when the measured signal strength exceeds the predetermined signal strength value.

4. The method of claim 1, wherein step (d) includes the step of:

translating the measured signal strength to an estimated separation distance using a predetermined radio signal propagation loss model.

5. The method of claim 1, further comprising the steps of:

classifying a multipath environment at the receiver using the received impulse signal;

selecting at least one radio propagation path loss model from a plurality of different radio propagation path loss models based on said classifying step; and wherein step (d) includes the step of estimating the separation distance based on the selected radio propagation path loss model.

6. The method of claim 5, wherein said classifying step includes the steps of:

determining a multipath amplitude decay time of the received impulse signal at the receiver;

matching the multipath amplitude decay time to one of a plurality of predetermined multipath amplitude decay time ranges each associated with a respective one of the plurality of different radio propagation path loss models; and

selecting a radio propagation path loss model associated with the matched multipath amplitude decay time range.

7. The method of claim 5, further comprising the step of

selecting the Radio Propagation Path Loss Model (RPPLM) from one of

(1) $P = k_1 r^{a1}$,

(2) $P = k_2 r^{a2}$, and

(3) $P_{avg} = k_3 r^{a3}$,

where

P represents a signal strength of a received impulse signal,

P_{avg} is an average signal strength of a predetermined number of received impulse signals, including multipath signals, having the greatest signal strengths among a plurality of received impulse signals,

k_1, k_2, and k_3 are proportionality constants,

a_1, a_2, and a_3 are real numbers in the approximate range of -2 to -4, and

r is a separation distance between the transmitter and the receiver.

8. The method of claim 1, wherein step (b) includes the step of receiving a plurality of impulse signals at the receiver corresponding to the transmitted impulse signal, the plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of the plurality of received impulse signals having a respective signal strength at the receiver; and wherein step (d) includes the step of

estimating the separation distance based on a selected one of the plurality of received impulse signals having a greatest signal strength among the plurality of received impulse signals.

9. The method of claim 1, wherein step (b) includes the step of receiving a plurality of impulse signals at the receiver corresponding to the transmitted impulse signal, the plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of the plurality of received impulse signals having a respective signal strength and a respective time of arrival at the receiver; and wherein step (d) includes the step of estimating the separation distance based on a selected one of the plurality of received impulse signals having an earliest time of arrival at the receiver.

10. The method of claim 1, wherein step (b) includes the step of receiving a plurality of impulse signals at the receiver corresponding to the transmitted impulse signal, the plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of the plurality of received impulse signals having a respective signal strength at the receiver; and wherein step (d) includes the step of

estimating the separation distance based on a selected number N of the plurality of received impulse signals having the greatest respective signal strengths among the plurality of received impulse signals, where N is an integer equal to or less than the number of the plurality of impulse signals.

11. The method of claim 1, wherein step (b) includes the step of receiving a plurality of impulse signals at the receiver corresponding to the transmitted impulse signal, the plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of the plurality of received impulse signals having a respective signal strength and a respective time of arrival at the receiver; and wherein step (d) includes the step of estimating the separation distance based on a signal strength decay envelope of the plurality of received impulse signals.

12. The method of claim 1, further comprising the step of indicating when the estimated separation distance corresponds to a predetermined separation distance.

13. An impulse radio system for estimating a separation distance between an impulse radio transmitter and an impulse radio receiver, comprising:

a transmitter for transmitting an impulse signal having one of an ultra-wideband and medium wideband frequency characteristics;

a receiver spaced from said transmitter for receiving said transmitted impulse signal, said receiver including

a signal evaluator that measures a signal strength of said received impulse signal, and

an estimator, coupled to said evaluator, that estimates the separation distance based on said measured signal strength.

14. The system of claim 13, wherein said estimator is a comparator that compares the measured signal strength to a predetermined signal strength reference signal supplied to an input of said comparator and indicative of a predetermined separation distance.

15. The system of claim 14, further comprising an indicator coupled to an output of said comparator, wherein said comparator drives said indicator when said measured signal strength exceeds said predetermined signal strength reference signal, to thereby indicate that an estimated separation distance between said receiver and said transmitter exceeds said predetermined separation distance.

16. The system of claim 13, wherein said receiver includes a controller that translates said measured signal strength to an estimated separation distance based on a predetermined radio signal propagation loss model.

17. The system of claim 13, wherein said receiver includes a controller that:

classifies a multipath environment at said receiver using said received impulse signal;

selects at least one radio propagation path loss model from a plurality of different radio propagation path loss models based on the multipath environment; and wherein

the estimator estimates the separation distance based on a selected radio propagation path loss model.

18. The system of claim 17, wherein the controller:

determines a multipath amplitude decay time of the received impulse signal at the receiver;

matches the multipath amplitude decay time to one of a plurality of predetermined multipath amplitude decay time ranges each associated with a respective one of said plurality of different radio propagation path loss models; and

selects a radio propagation path loss model associated with a matched multipath amplitude decay time range.

19. The system of claim 17, wherein said selected Radio Propagation Path Loss Model (RPPLM) is selected from one of

(1) $P = k_1 r^{a1}$,

(2) $P = k_2 r^{a2}$, and

(3) $P_{avg} = k_3 r^{a3}$,

where

P represents a signal strength of a received impulse signal,

P_{avg} is an average signal strength of a predetermined number of received impulse signals, including multipath signals, having the greatest signal strengths among a plurality of received impulse signals,

k_1, k_2, and k_3 are proportionality constants,

a_1, a_2, and a_3 are real numbers in the approximate range of -2 to -4, and

r is a separation distance between said transmitter and said receiver.

20. The system of claim 13, wherein a plurality of impulse signals corresponding to said transmitted impulse signal are received at said receiver, said plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of said plurality of received impulse signals having a respective signal strength at said receiver, and wherein said estimator is configured to estimate the separation distance based on a selected one of said

plurality of received impulse signals having a greatest signal strength among said plurality of received impulse signals.

21. The system of claim 13, wherein a plurality of impulse signals corresponding to said transmitted impulse signal are received at said receiver, said plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of said plurality of received impulse signals having a respective signal strength at said receiver, and wherein said estimator is configured to estimate the separation distance based on a selected one of said plurality of received impulse signals having an earliest time of arrival at said receiver.

22. The system of claim 13, wherein a plurality of impulse signals corresponding to said transmitted impulse signal are received at said receiver, said plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of said plurality of received impulse signals having a respective signal strength at said receiver, and wherein said estimator is configured to estimate the separation distance based on a selected number N of said plurality of received impulse signals having the greatest respective signal strengths among said plurality of received impulse signals, where N is an integer equal to or less than the number of said plurality of impulse signals.

23. The system of claim 13, wherein a plurality of impulse signals corresponding to said transmitted impulse signal are received at said receiver, said plurality of impulse signals including at least one impulse signal arising from radio propagation multipath effects, each of said plurality of received impulse signals having a respective signal strength at said receiver, and wherein said estimator is configured to estimate the separation distance based on a signal strength decay envelope of said plurality of received impulse signals.

24. The system of claim 13, further comprising an indicator coupled to an output of said estimator, wherein said estimator drives the indicator when an estimated separation distance corresponds to a predetermined separation distance.

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